



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,019	09/30/2003	Harry Fuerhaupter	ATODP0100US	4826

7590 05/24/2007
Thomas W. Adams
Renner, Otto, Boisselle & Sklar, LLP
Nineteenth Floor
1621 Euclid Avenue
Cleveland, OH 44115-2191

EXAMINER

CULBERT, ROBERTS P

ART UNIT	PAPER NUMBER
----------	--------------

1763

MAIL DATE	DELIVERY MODE
-----------	---------------

05/24/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.		Applicant(s)	
	10/675,019		FUERHAUPTER ET AL.	
	Examiner		Art Unit	
	Roberts Culbert		1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20, 22 and 25-44 is/are pending in the application.
- 4a) Of the above claim(s) 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18, 22 and 25-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 3/13/07 have been fully considered.

Applicant has argued that the solution of Bayes et al. does not produce the same results as the solution of the present invention. However, the argument is not persuasive since the claimed solution and treatment conditions are identical to the solution and treatment conditions of Bayes et al. and thus would necessarily produce the same results such as increase in surface area, or else the results arise from essential limitations not provided in the Claims.

The declaration under 37 CFR 1.132 of Patrick P. Brooks filed 3/13/07 is insufficient to overcome the rejection of the claims based upon the Prior Art as set forth in the last Office action. The tests performed are not commensurate in scope with either the broadly Claimed invention or the invention of Bayes et al. For example, Bayes et al. teaches a broad acid concentration range of 1-50% or preferably 1-30% and a peroxide concentration of from 0.01% up to 20%, or preferably 0.5 and 10%, and teaches various corrosion inhibitors such as benzotriazole (BTA). However the declaration limits the composition of Bayes et al. to one particular composition selected from 3 of the 130 examples in Bayes et al. which uses a particular acid concentration and does not contain benzotriazole. Similarly, the declaration chooses to test only a selected example from the broad ranges and compositions of the Claimed invention.

The declaration under 37 CFR 1.132 of Craig V. Bishop filed 3/13/07 is insufficient to overcome the rejection of the claims based upon the Prior Art as set forth in the last Office action because the declaration provides no further evidence in support of arguments.

Art Unit: 1763

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-5, 8-18 and 25-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,500,349 to Andresakis et al. in view of U.S. Patent Application Publication 2003/0029730 to Lee et al. and U.S. Patent 6,261,466 to Bayes et al.

Regarding Claim 1, Andresakis et al. teach a process to improve adhesion of dielectric materials to a metal layer comprising: providing an unpatterned metal layer, wherein the metal layer comprises a layer of copper having a first major surface, micro-roughening the first major surface to form a micro-roughened surface (Col. 4, lines 44-47) and etching the metal layer to form a circuit pattern the metal layer, wherein the micro-roughening is carried out prior to the etching.

Regarding Claim 28, Andresakis et al. teach a process to improve adhesion of dielectric materials to a metal layer comprising providing an unpatterned copper metal layer having a first major surface, micro-roughening the unpatterned metal layer with solution to form a micro roughened surface on the first

Art Unit: 1763

major surface, applying an etch resist to the micro-roughened surface, patterning the resist, (Col. 6, Lines 1-2) etching the metal layer which is not protected by the resist to form a circuit pattern (Col. 6, Lines 14-20) and removing the resist (Col. 6, Lines 23-25) wherein the micro-roughened surface is not subjected to a further roughening. (Col. 7, Lines 18-21)

Regarding Claim 36, Andresakis et al. teach a process to improve adhesion of dielectric materials micro-roughening the unpatterned metal layer with solution to form a micro roughened surface on the first major surface, applying an etch resist to the micro-roughened surface, patterning the resist, (Col. 6, Lines 1-2) etching the metal layer which is not protected by the resist to form a circuit pattern (Col. 6, Lines 14-20) and removing the resist (Col. 6, Lines 23-25) and optionally applying a secondary metal coating (Col. 7, Lines 22-27) and dielectric (Col. 7, lines 1-8) to the micro-roughened surface.

Regarding Claims 1, 28 and 36, as applied above, Andresakis et al. teach the method of the invention substantially as claimed, but does not expressly teach using a layer of copper and a layer of a second metal or alloy such as 64% iron and 36% nickel. However, Lee et al. teach that Copper-invar-copper (CIC) may be used to form circuit elements having low thermal expansion. It would have been obvious to one of ordinary skill in the art at the time of invention to use the copper-invar-copper composite of Lee et al. in the method of Andresakis in order to form circuit elements having low thermal expansion. Note that Lee et al. also teaches that the CIC material may be treated to improve adhesion properties. (Paragraph 41)

Further Regarding Claims 1, 28 and 36, Andresakis et al. teach the method of the invention substantially as claimed, but does not expressly teach using water, acid, oxidant, and corrosion inhibitor. However, Bayes et al. teach a micro-roughening treatment for copper to improve adhesion to polymers comprising treating with a solution of water, acid, oxidant, and corrosion inhibitor (tetrazole). It would have been obvious to one of ordinary skill in the art at the time of invention to the micro-roughening solution of Bayes to perform the micro-roughening step of Andresakis because Bayes teaches (See Col.1-6 of Bayes et al.) that the solution may be advantageously substituted for the prior art black-oxide type roughening that is described in Andresakis at Col. 4, Lines 44-59.

Art Unit: 1763

Further Regarding Claims 1, 28 and 36, Andresakis et al. do not expressly teach that the surface area is increased by a factor of from about 60% to about 120% in the microroughening step by using the micro-roughening solution. However, since the prior art teaches the same micro-etching solution composition and etches the same material (copper) using the same process conditions such as temperature, concentration and duration, the limitations would necessarily be produced by one of ordinary skill in the art to form an adhesion surface or else arise from essential limitations not provided in the claims.

Further Regarding Claim 44, Andresakis et al. do not expressly teach the amount of metal removed by the micro-roughening solution. However, since the prior art teaches the same micro-etching solution and etches the same material (copper) the limitation would necessarily be produced by one of ordinary skill in the art to form an adhesion surface or else from essential limitations not provided in the claims.

Regarding Claims 2, 29, and 37, Andresakis et al. teach the unpatterned metal layer is not treated to increase surface roughness prior to the micro-roughening.

Regarding Claims 3 and 38, Andresakis et al. teach the micro-roughened surface is not subjected to further roughening following the etching. (Col. 7, Lines 18-21)

Regarding Claims 4, 30 and 39, Andresakis et al. teach the cross sectional area of the circuit pattern is not substantially further reduced subsequent to the etching.

Regarding Claim 5, Bayes teaches cleaning prior to micro-roughening (Col. 6, Lines 21-35).

Regarding Claim 8, Andresakis et al. teach applying an etch resist to the micro-roughened surface and patterning the etch resist prior to the etching. (Col. 5, Line 36 – Col. 6, Line 14)

Regarding Claim 9, Andresakis et al. teach removing the etch resist. (Col. 6, Lines 23-25)

Regarding Claims 10, 31 and 40, Andresakis et al. teach applying a secondary metal coating to the circuit pattern. (Col. 7, Lines 22-27)

Regarding Claims 11 and 32, Andresakis et al. teach applying a dielectric material to the circuit pattern. (Col. 6, Line 41 – Col. 8, Line 11)

Art Unit: 1763

Regarding Claims 16-18, Bayes et al. teach the acid comprises sulfuric acid, peroxide such as hydrogen peroxide and corrosion inhibitors such as benzotriazole.

Regarding Claims 26 and 27, Andresakis et al. teach that the micro-roughened surface covers about 90% or substantially the entire first major surface since the entire foil is treated.

Regarding Claim 12, 13, 33, 34, 41 and 44, Andresakis et al. teach the method of the invention substantially as claimed, but do not expressly teach the galvanic edge effect. However, the claimed "edge effect" is an inherent result of the process, such as etched material (CIC) and microroughening mixture, and is therefore met by the prior art process or else arises from essential limitations not provided in the claims.

Regarding Claim 25, Andresakis et al. teach the method of the invention substantially as claimed, but do not expressly teach the resulting roughness produced by the micro-roughening solution. However, since the prior art teaches the same micro-etching solution and etches the same material copper the surface limitations would necessarily be produced by one of ordinary skill in the art of using such solutions to form an adhesion surface.

Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,500,349 to Andresakis et al. in view of in view of U.S. Patent Application Publication 2003/0029730 to Lee et al. and U.S. Patent 6,261,466 to Bayes et al. as applied above to claims 1-5, 8-18 and 24-43, and in further view of U.S. Patent 6,562,149 to Grieser et al, U.S. Patent 6,036,758 to Fairweather, and U.S. Patent 4,637,899 to Kennedy, Jr.

Andresakis et al. teach the method of the invention substantially as claimed, but does not expressly teach cleaning and preconditioning with water-soluble alcohol and corrosion inhibitor prior to micro-roughening. However the steps of cleaning and conditioning prior to micro-etching are old and well known in the art. For example, Grieser teaches the known steps of cleaning and conditioning (predipping) with a corrosion inhibitor prior to micro roughening. (Col. 5, Lines 43-45) Fairweather teaches cleaning and conditioning prior to micro-roughening (Col. 4, Lines 15-23) Kennedy Jr. teaches corrosion inhibitor

Art Unit: 1763

solutions containing water soluble alcohol in order to improve solubility, lower freezing point etc. (Col. 3, lines 17-37)

It would have been obvious to one of ordinary skill in the art at the time of invention to perform cleaning and pre-conditioning steps in order to prepare the substrate for microroughening in the well-known manner.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1763

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



R. Culbert
Examiner
Art Unit 1763



Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763